UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/192,837	08/15/2008	James Timothy Cronin		3552

129406 7590 01/25/2017

The Chemours Company
Patent Legal Group
1007 Market Street
7028-1
Wilmington, DE 19801

EXAMINER
NGUYEN, NGOC YEN M

ART UNIT	PAPER NUMBER
1734	

NOTIFICATION DATE	DELIVERY MODE
01/25/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentlegal@chemours.com
gwen.a.wilson@chemours.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JAMES TIMOTHY CRONIN and LISA EDITH HELBERG

Appeal 2016-000898
Application 12/192,837
Technology Center 1700

Before CHUNG K. PAK, JEFFREY T. SMITH, and
WESLEY B. DERRICK, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants[1] appeal under 35 U.S.C. § 134(a) from the Examiner's decision finally rejecting claims 102 through 108, 110, 112, 116, and 117.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

---

[1] Appellants identify the Real Party in Interest as E. I. DuPont de Nemours & Co., Inc. (Appeal Brief filed April 29, 2015 ("App. Br."), 4.)

[2] Claims 109, 111, and 113–115 stand withdrawn from consideration. (Final Office Action entered September 5, 2014 ("Final Act."), 2.) Appellants cancelled claims 118 and 119 in the Appeal Brief (App. Br. 7), and the Examiner acknowledged their cancellation in the Answer. (Examiner's Answer entered October 1, 2015 ("Ans."), 2.)

STATEMENT OF THE CASE

The subject matter on appeal is generally directed to a process for minimizing the number of bed regenerations during a titanium manufacturing process. (Spec. 10, ll. 23–28.)

Details of the appealed subject matter are recited in representative claim 102, which is reproduced below from the Claims Appendix to the Appeal Brief:

> 102. A process for extending useful carbon bed lifetime and minimizing the number of bed regenerations during a titanium manufacturing process, comprising:
>
> (a) providing a titanium chloride-containing feedstock comprising an impurity not detectable by a direct analytical technique and at least one tracker species detectable by the direct analytical technique selected from the group consisting of phosgene, carbonyl sulfide, sulfur dioxide, carbon disulfide, thionyl chloride, sulfur chloride, SO_2Cl_2, carbon dioxide, and hydrochloric acid and combinations thereof;
>
> (b) feeding the titanium chloride-containing feedstock to an activated carbon bed;
>
> (c) contacting the titanium chloride-containing feedstock with the activated carbon by flowing the feedstock through the activated carbon bed to remove at least a portion of both the tracker species detectable by the direct analytical technique and the impurity not detectable by a direct analytical technique from the feedstock to form a treated product; and
>
> (d) continuing the flow of the titanium chloride-containing feedstock at least until the tracker species is detected by the direct analytical technique in the treated product as an indicator of the elution of the impurity not detectable by a direct analytical technique from the activated carbon bed.

(App. Br., Appendix 1.)

Appellants seek review of the following grounds of rejection maintained by the Examiner in the Answer:[3]

Claims 102–108, 110, 112, 116, and 117 under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement; and

Claims 102–108, 110, 112, 116, and 117 under 35 U.S.C. § 103(a) as unpatentable over the disclosure of Efremov et al., *Adsorption Purification of Titanium Tetrachloride*, 45 Khim. Prom. 758 (1969) (hereinafter referred to as "Efremov")[4], U.S. patent 4,025,426, issued in the name of Anderson et al. on May 24, 1977 (hereinafter referred to as "Anderson"), Starshenko et al., *State of the Analytical Control of Cleaning the Titanium Tetrachloride* (hereinafter referred to as "Starshenko"),[5] optionally further in view of U.S.

---

[3] Although Appellants list the Examiner's withdrawal from consideration of claims 109, 111, and 113–115 in the "Grounds of Rejection to be Reviewed on Appeal" in their Appel Brief (App. Br. 12), and request rejoinder of these claims (App. Br. 17, 30), the propriety of the Examiner's withdrawal of these claims from consideration is reviewable by a petition under 37 C.F.R. § 1.181, and therefore is not within the jurisdiction of the Board. *In re Berger*, 279 F.3d 975, 984 (Fed. Cir. 2002) ("There are a host of various kinds of decisions an examiner makes in the examination proceeding-mostly matters of a discretionary, procedural or nonsubstantive nature-which have not been and are not now appealable to the board or to this court when they are not directly connected with the merits of issues involving rejections of claims, but traditionally have been settled by petition to the Commissioner."): *see also Ex Parte Frye*, 94 USPQ 2d 1072, 1078 (BPAI 2010) (precedential).

[4] The Examiner's reference to Efremov is to the corresponding English translation of record.

[5] The Examiner provides only the title of Starshenko, and no further information for the reference is available on this record. In addition,

patent 3,596,438, issued in the name of Beukenkamp et al. on August 3, 1971 (hereinafter referred to as "Beukenkamp"), and U.S. Patent 4,783,324, issued in the name of Walters et al. on November 8, 1988 (hereinafter referred to as "Walters").

DISCUSSION

Upon consideration of the evidence on this appeal record and each of Appellants' contentions, we affirm the Examiner's rejection of claims 102–108, 110, 112, 116, and 117 under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement, and Examiner's rejection of claims 102–108, 110, 112, 116, and 117 under 35 U.S.C. § 103(a) for obviousness for the reasons set forth in the Final Action and the Answer. We add the discussion below primarily for emphasis and completeness.

Rejection of Claims 102–108, 110, 112, 116, and 117 under § 112, First Paragraph for Failing to Comply with the Written Description Requirement

Claim 102 recites a process for extending useful carbon bed lifetime and minimizing the number of bed regenerations during a titanium manufacturing process.

The Examiner finds that the Specification does not provide written description support for a process that extends useful carbon bed lifetime as recited in claim 102. (Final Act. 2.) Specifically, the Examiner finds that although the Specification indicates that the process of claim 102 minimizes the number of carbon bed regenerations, the Specification does not indicate

---

Appellants do not contest the Examiner's reliance on the English translation of record as corresponding to this reference.

that the process extends the useful carbon bed lifetime, and does not indicate that a correlation exists between the number of regenerations and the carbon bed lifetime. (*Id.*)

Appellants do not dispute the Examiner's finding that the Specification does not indicate that the process of claim 102 extends the useful lifetime of the carbon bed. (App. Br. 13–15.) Instead, Appellants argue that the preamble phrase at issue—"extending useful carbon bed lifetime"—is not a limitation of claim 102 because it does not recite essential structure or steps; is not necessary to give life, meaning, and vitality to the claim; was not added during prosecution to overcome prior art; and merely states the intended use or purpose of the claimed process. (App. Br. 15.)

However, regardless of whether the phrase at issue is in the preamble of claim 102, it is still recited in the claim, and Appellants do not direct us to any disclosure in the Specification demonstrating that the inventors were in possession of a process that extends useful carbon bed lifetime at the time of filing. (App. Br. 13–15.) *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–1564 (Fed. Cir. 1991) (To fulfill with written description requirement "the applicant must . . . convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention. The invention is, for purposes of the 'written description' inquiry, whatever is now claimed.") Appellants' arguments thus fail to identify any error in the Examiner's finding that the Specification, as originally filed, does not disclose extending useful carbon bed lifetime in the process of claim 102. *In re Jung,* 637 F.3d 1356, 1365 (Fed. Cir. 2011) (explaining that even if the examiner had failed to make a prima facie case,

it has long been the Board's practice to require an appellant to identify the alleged error in the examiner's rejection).

Claim 102 further recites that the process comprises "providing a titanium chloride-containing feedstock comprising an impurity not detectable by a direct analytical technique." The impurity recited in claim 102 includes any impurity that is not detectable by a direct analytical technique.

The Examiner finds that the Specification does not provide written description support for "an impurity not detectable by a direct analytical technique" because the Specification only indicates that arsenic cannot be directly and rapidly measured, and does not describe any other impurities cannot be directly and rapidly measured. (Final Act. 3.)

Appellants argue that support for "an impurity not detectable by a direct analytical technique" is found at page 2, lines 3–5 of their Specification, which states that "[t]here are no known methods for directly measuring, in real-time, low ppm concentrations of the (elemental) arsenic in a neat commercially available titanium tetrachloride solution." (App. Br. 15.) Appellants also point to page 2, lines 30–32 of their Specification, which also indicate that arsenic cannot be directly and rapidly measured. (*Id.*)

However, the portions of the Specification cited by Appellants do not identify any impurities other than arsenic that are not detectable by a direct analytical technique. (Spec. 2, ll. 3–5, 30–32.) Accordingly, the relied-upon disclosures are insufficient to demonstrate that the inventors were in possession of any impurity other than arsenic that was not detectable by a

direct analytical technique at the time of filing. *Vas-Cath,* 935 F.2d at 1563–1564.

Appellants further argue that it was known to those skilled in the art at the time of the invention that the chemical behavior of arsenic and antimony are similar, and the disclosure in Walters' examples of measuring only the total of arsenic plus antimony provides an example of the similarity of the chemistry of these two elements. (App. Br. 18.) However, the relied-upon disclosures in Walters do not demonstrate that antimony is not detectable by a direct analytical technique. Specifically, Walters' examples indicate that samples of commercially available anhydrous titanium tetrachloride were assayed and found to contain 6.6 ppm, 18 ppm, 11 ppm, and 23.3 ppm of "antimony and arsenic combined." (Walters col. 1, ll. 62–col. 2, ll. 47.) We find no disclosure in Walters indicating whether the amounts of arsenic and antimony were determined individually and then combined, or were determined together due to their similar chemical behavior, as Appellants assert. Moreover, Walters' examples indicate that at the very least, the combined amount of arsenic and antimony can be determined in anhydrous titanium tetrachloride. The relied-upon disclosures in Walters therefore fail to demonstrate that antimony cannot be detected by a direct analytical technique. Nor do the relied-upon disclosures in Walters demonstrate that the inventors, at the time of the invention, had possession of antimony or any impurities, other than arsenic, included in the claim as an impurity that cannot be detected by a direct analytical technique.

Appellants also argue that $VOCl_3$ can be measured directly by FTIR at a high concentration in $TiC1_4$, but only in a matrix that does not contain COS. (App. Br. 18.) Appellants contend that in the presence of COS,

$VOCl_3$ would therefore be a species that is not measurable by rapid, direct techniques, and would need to be measured off-line. (App. Br. 18–19.) In support of this argument, Appellants point to Starshenko's disclosure that "the sensitivities for the two major peaks for VOC_3 in $TiC1_4$ are given as 0.02% at 1035 cm^{-1} and 0.004% at 2061 cm^{-1}. The sensitivity for the major COS peak is given as 0.000015% at 2043 cm^{-1}." (App. Br. 18.) Appellants argue that "[f]rom this example, it is obvious to one skilled in the art that the COS peak at 2043 cm^{-1} is much larger than the $VOCl_3$ peak at 2061 cm^{-1}."[6] (App. Br. 18–19.) However, claim 102 does not recite particular conditions under which impurities cannot be detected by a direct analytical technique, such as in the presence of COS. Accordingly, regardless of whether Starshenko's disclosures demonstrate that $VOCl_3$ cannot be measured in the presence of COS, the relied-upon disclosures in Starshenko do not demonstrate that $VOCl_3$ is not detectable by a direct analytical technique under any conditions, without optional COS, as recited in claim 102.

We accordingly sustain the Examiner's rejection of claims 102–108, 110, 112, 116, and 117 under § 112, first paragraph, for failing to comply with the written description requirement.

[6] It is well established that a "description which renders obvious the invention for which an earlier filing date is sought is not sufficient" to meet the written description requirement under § 112, first paragraph. *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997)

Rejection of Claims 102–108, 110, 112, 116, and 117 under § 103(a)[7]

Appellants do not dispute the Examiner's finding that Efremov discloses a process for removing impurities, from titanium tetrachloride by contacting the titanium tetrachloride with activated carbon. (*Compare* Final Act. 3, *with* App. Br. 19–29.) Nor do Appellants dispute the Examiner's finding that Efremov discloses that impurities present in titanium tetrachloride include arsenic, chlorides of metals, chlorides, and oxychlorides of metalloids, and organic chlorine compounds, such as $AsCl_3$ (arsenic chloride), CS_2 (carbon disulfide), and S_2Cl_2 (sulfur chloride). (*Compare* Final Act. 4, *with* App. Br. 19–29.) Figure 4 of Efremov illustrates the removal of particular amounts of $AsCl_3$ (arsenic chloride), CS_2 (carbon disulfide), and S_2Cl_2 (sulfur chloride) contained in $TiCl_4$ with activated carbon. *See also* Efremov, pp. 3 and 6. The Examiner acknowledges that Efremov does not disclose the presence of optional COS, Sb, V, and CO_2 impurities in titanium tetrachloride, and the Examiner relies on Starshenko's disclosure that titanium tetrachloride usually contains impurities such as COS, CO_2, and $VOCl_3$, whose presence can be detected with infrared spectroscopy, which Appellants do not dispute. (*Compare* Final Act. 4, *with* App. Br. 19–29.)

[7] We limit our discussion to those claims separately argued, and claims not separately argued stand or fall with the separately argued claims. 37 C.F.R. § 41.37(c)(1)(iv). Appellants argue claims 102–108, 110, 112, 116, and 117 as a group. (*See generally* App. Br. 19–29.) Therefore, for the purposes of this appeal, we select claim 102 as representative, and decide the propriety of the rejection of claims 102–108, 110, 112, 116, and 117 based on claim 102 alone.

The Examiner also acknowledges that Efremov does not disclose monitoring the level of impurities in the purified titanium tetrachloride after contact with the activated carbon to determine when to regenerate the activated carbon. (Final Act. 4.) To address this feature missing from Efremov's disclosures, the Examiner relies on Anderson's disclosure of a process for removing impurities from a liquid with activated carbon that involves controlling the timing of reactivation (regeneration) of the activated carbon by monitoring the level of impurities in both the liquid fed to the activated carbon, and the liquid output from the activated carbon, to determine the total amount of impurities removed, and reactivating the carbon when the value in the output exceeds a predetermined value, which Appellants do not dispute. (*Compare* Final Act. 5, *with* App. Br. 19–29.)

Based on the above findings, the Examiner concludes that it would have been obvious to one of ordinary skill in the art to regenerate the activated carbon used in the process of purifying titanium tetrachloride disclosed in Efremov when the output of an impurity, "such as COS [disclosed in Starshenko or carbon disulfide or sulfur chloride disclosed in Efremov]," exceeds a predetermined value as suggested by Anderson, to prevent premature regeneration of the activated carbon. (Final Act. 5.) The Examiner finds that the activated carbon would remove other impurities present in titanium tetrachloride, such as those suggested by Efremov and/or Starshenko. (Final Act. 4–5; Ans. 11.)

Appellants argue that the applied prior art does not disclose the use of a tracker species, such as COS, carbon disulfide, and/or sulfur chloride, in the manufacture of titanium products. (App. Br. 28–29.) Appellants further argue that one of ordinary skill in the art would not have known at the time

of the invention that it was possible to identify tracker species that are able to predict the release of an impurity such as arsenic during a titanium product manufacturing process, so as to accurately choose when to regenerate a carbon bed. (App. Br. 23–24.)

However, we agree with the Examiner that Anderson's disclosure of regenerating activated carbon when an impurity output from the activated carbon exceeds a predetermined value would have led one of ordinary skill in the art to incorporate such a procedure for monitoring the output of an impurity, such as COS disclosed in Starshenko or carbon disulfide and/or sulfur chloride disclosed in Efremov (corresponding to the recited tracker species), during the process of purifying titanium tetrachloride with the activated carbon disclosed in Efremov to prevent premature regeneration of Efremov's activated carbon (i.e., maximize the use of Efremov's activated carbon before it is regenerated). (Anderson col. 6, l. 21–col. 7, l. 2; cl. 5–6; Starshenko 1, ¶ 4; 2, Table 1; Efremov 1.) Furthermore, Anderson, by teaching the use of the level of an impurity, e.g., COS, sulfur chloride, and/or carbon disulfide, in the effluent of Efremov's activated carbon as an indicator that the activated carbon is spent (used up) and requires regeneration implies that the spent carbon cannot adsorb not only a sufficient amount of the monitored impurity, but also other impurities, such as arsenic disclosed in Efremov and/or $VOCl_3$ disclosed in Starshenko, which are normally adsorbed by unspent activated carbon. Appellants' arguments are therefore unpersuasive of reversible error.

Appellants also argue that unlike their invention "Anderson is teaching to start the regeneration cycle based directly from a measurement of the impurity of interest." (App. Br. 25.) Appellants contend that Anderson

does not teach one skilled in the art to monitor a measurable impurity such as a tracker, as a way of determining a moment prior to breakthrough of at least one non-measurable impurity. (App. Br. 27.)

However, as discussed above, the collective teachings of Efremov, Starshenko, and Anderson indicate or suggest that when the level of the monitored impurity that corresponds to the recited tracker species exceeds a predetermined value, the carbon is incapable of adsorbing not only the monitored impurity, but also other impurities that would also be present in the titanium tetrachloride feed because the activated carbon is simply spent and requires regeneration before it can adsorb sufficient amounts of impurities, including those identified by Appellants as tracker species. Appellants' arguments are therefore unpersuasive of reversible error.

In response to the Examiner's finding that Starshenko discloses that analysis of the molecular forms of titanium tetrachloride impurities (admixtures) has important significance for developing means to remove the impurities from titanium tetrachloride (Final Act. 4), Appellants argue that these statements in Starshenko do not suggest ways to solve this problem. (App. Br. 24–25.) However, these arguments are unpersuasive of reversible error because they are improperly based only Starshenko alone, and do not take into account what the combined disclosures of Efremov, Starshenko, and Anderson would have suggested to one of ordinary skill in the art at the time of the invention. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) ("Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references."); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (The test for obviousness "is what the combined teachings of the references

would have suggested to those of ordinary skill in the art.") As discussed above, the combined disclosures of the applied prior art would have led one of ordinary skill in the art to regenerate the activated carbon used in the process of purifying titanium tetrachloride disclosed in Efremov when the output of an impurity, such as COS disclosed in Starshenko or carbon disulfide, and/or sulfur chloride disclosed in Efremov, exceeds a predetermined value as suggested by Anderson, to show that the activated carbon bed is essentially spent and is no longer useful for removing sufficient amounts of any impurities, including arsenic in Efremov, in the absence of regeneration of such spent carbon bed.

Appellants further argue that Efremov's disclosure of adding synthesized radioactive contaminants to a sample before purification and monitoring the radioactive contaminates after purification teaches away from the process of claim 102 in which one or more tracker species found naturally in a titanium chloride containing feedstock is measured by a direct analytical technique. (App. Br. 27-28.) However, Efremov's disclosure of monitoring added radioactive contaminates during purification of titanium tetrachloride would not have discouraged one of ordinary skill in the art from following Anderson's suggestion of regenerating the activated carbon used in Efremov's process when the output of an impurity exceeds a predetermined value, because Efremov's disclosures do not criticize or disparage such a process. *In re Fulton*, 391 F.3d at 1201; *In re Gurley*, 27 F.3d at 552–53.

Appellants also argue that Anderson teaches away from a process of monitoring a measurable impurity as a way of determining a moment prior to breakthrough of at least one non-measurable impurity because Anderson

teaches a standard control system in which the amount of a particular impurity in an effluent is measured, and when a predetermined amount of the impurity is reached, a regeneration cycle is started. (App. Br. 26–27.)

However, as discussed above, Anderson's disclosure of regenerating activated carbon when an impurity (e.g., the recited tracker species) output from the activated carbon exceeds a predetermined value implies that at that point the carbon would also be incapable of absorbing other impurities present in the feed, such as arsenic disclosed in Efremov. Anderson, by teaching that the activated carbon bed is spent upon exceeding a predetermined impurity (the recited tracker species) level in the effluent also indicates that the carbon bed is no longer capable of adsorbing not only the impurity of interest (the recited tracker species), but also other impurities, such as arsenic, normally adsorbed by the activated carbon if it is not spent. This is particularly true because Efremov teaches that "[a]rsenic and sulfur impurities are best adsorbed by BAU activated carbon" and illustrates similar adsorption curves for S_2Cl_2 (sulfur chloride), CS_2 (carbon disulfide), and $AsCl_3$ (arsenic chloride) in $TiCl_4$ when exposed to BAU carbon adsorbent in Figure 4. *See* Efremove, pp. 3 and 6. Therefore, Anderson does not teach away from the process of claim 102 inasmuch as it does not criticize or disparage a process employing an impurity that corresponds to the recited tracker species as an indicator of the elution of other impurities, including an impurity that is not detectable by a direct analytical technique, for the spent carbon bed can no longer adsorb sufficient amounts of impurities and requires regeneration..

Appellants also argue that the Declaration of an inventor, James Cronin, submitted to the Patent Office on November 13, 2013 ("the Cronin

Declaration"), demonstrates the unexpected nature and commercial success of the process of claim 102. (App. Br. 24.)

However, Appellants do not meet their burden of demonstrating that the claimed invention imparts unexpected results that are reasonably commensurate with the scope of protection sought by the claims on appeal. *In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972) ("the burden of showing unexpected results rests on he who asserts them"); *In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) ("Even assuming that the results were unexpected, Harris needed to show results covering the scope of the claimed range. Alternatively Harris needed to narrow the claims."); *In re Greenfield*, 571 F.2d 1185, 1189 (CCPA 1978) ("Establishing that one (or a small number of) species gives unexpected results is inadequate proof, for 'it is the view of this court that objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.'" (*quoting In re Tiffin*, 448 F.2d 791, 792 (CCPA 1971))).

The Cronin Declaration states that a practical means of monitoring the concentration of $AsCl_3$ in real time in a commercial chemical plant environment does not exist. (Cronin Dec. ¶ 3.) The Declaration further states that Dr. Cronin and the co-inventor surprisingly discovered that they could predict when $AsCl_3$ would pass through a carbon bed (break through) used in the production of ultra-pure titanium tetrachloride based on the order of elution of common chloride process byproducts after evaluating numerous batches of plant $TiCl_4$ samples and various kinds of activated carbon. (*Id.*)

However, Appellants and the Declarant do not identify the specific conditions, specific $TiCl_4$ samples, specific impurities, specific tracker species and specific kinds of activated carbon used in the above

experimental evaluation. (App. Br. 24; Cronin Dec. ¶ 3.) Nor do Appellants and the Declarant explain why the limited showing of a single compound whose concentration cannot be determined in real time in a commercial chemical plant environment—$AsCl_3$—is reasonably commensurate in scope with any and all impurities not detectable by a direct analytical technique encompassed by claim 102 or the limited showing of unknown tracker species is reasonably commensurate in scope with all the tracker species encompassed by claim 102. (App. Br. 24; Cronin Dec. ¶ 3.) Moreover, as correctly found by the Examiner, Efremov teaches that both arsenic, $AsCl_3$, and sulfur impurities (e.g., carbon disulfide (CS_2) and sulfur chloride (S_2Cl_2)—which Appellants designate as tracker species) are best adsorbed by activated carbon, with its Figure 4 illustrating similar adsorption curves for $AsCl_3$ and sulfur impurities, thus implying that the activated carbon adsorbs arsenic impurity and sulfur impurities (tracker species) at similar rates. Final Act. 4; Efremov pp. 3 and 6 and Fig. 4. Thus, there is nothing surprising or unexpected about the inventors' prediction that when the activated carbon is spent and is no longer capable of adsorbing sulfur impurities, it also is incapable of adsorbing arsenic impurity. Therefore, on this record, Appellants fail to carry their burden of demonstrating unexpected results sufficient to overcome the Examiner's prima facie case of obviousness.

In addition, Appellants do not provide any evidence whatsoever demonstrating that the process of claim 102 was commercially successful. (*See generally* App. Br. and Cronin Dec.) The Cronin Declaration does not discuss what percentage of the industry employed or bought the process encompassed by claim 102 or whether such employment or sale is a direct

result of the unique characteristics of the process encompassed by claim 101. *Id.*; *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) (Appellants must offer proof that the asserted commercial success occurred in the relevant market and "that the sales were a direct result of the unique characteristics of the claimed invention—as opposed to other economic and commercial factors unrelated to the quality of the patented subject matter.").

Appellants also argue that the Cronin Declaration demonstrates "long felt need" because "Dr. Cronin clearly indicates the field of titanium manufacturing was aware of problems associated with timely replacement of carbon beds and that these problems existed for a long time without solutions." (App. Br. 24.)

However, we do not find the proffered opinion of long-felt need to be supported by the evidence of record. As discussed *supra*, Anderson teaches that the timely replacement and regeneration of the spent carbon bed was known through monitoring impurities, including those Appellants defined as a tracker species, at the time of the invention. Therefore, we find the opinion insufficient to meet the evidentiary burden required to establish a long-felt need that was allegedly solved by Appellants' invention. (*See generally* App. Br. and Cronin Dec.; *In re Gershon*, 372 F.2d 535, 538–39 (CCPA 1967) (Establishing long-felt need requires objective evidence showing existence of a persistent problem recognized by those of ordinary skill in the art for which a solution was not known.)). Specifically, the Cronin Declaration lacks adequate factual corroboration of the opinion that minimizing the number of carbon bed regenerations was a long-unsolved problem in the art. (Cronin Dec. ¶ 3.) It follows that we decline to give the Cronin Declaration full evidentiary weight. *In re Am. Acad. of Sci. Tech*

Ctr., 367 F.3d 1359, 1368 (Fed. Cir. 2004) ("[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations."); *Velander v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003) ("In giving more weight to prior publications than to subsequent conclusory statements by experts, the Board acted well within [its] discretion."); *Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (The Board has discretion to give more weight to one item of evidence over another "unless no reasonable trier of fact could have done so").

Accordingly, on this record, the evidence of obviousness discussed above outweighs the proffered evidence of non-obviousness.

We accordingly sustain the Examiner's rejection of claims 102–108, 110, 112, 116, and 117 under 35 U.S.C. § 103(a).

ORDER

In view of the reasons set forth above and in the Final Action and the Answer, we affirm the Examiner's decision rejecting claims 102–108, 110, 112, 116, and 117 under § 112, first paragraph for failing to comply with the written description requirement, and the Examiner's decision rejecting claims 102–108, 110, 112, 116, and 117 under § 103(a).

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED